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RESEARCH PAPER

Enabling Conditions for Successful Greening of Public Spaces: The Case of Touroua, Cameroon Based on Perceptions

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Abstract This study seeks to verify the perceptions of male and female respondents on the meaning and causes of success or failure in tree planting in public spaces and whether the specific projects were successful or failures. This was verified because the meaning and causes of success or failure in tree planting and whether a project is a success may have different meanings to different people in different parts of the world. This evaluation is motivated by the rising rates of tree planting failures recorded in Cameroon. Data were obtained through a focus group discussion, interviews with key informants, researcher's observations and a survey. Statistical testing revealed that a major factor in success in tree planting is the active involvement of all stakeholders in the design, elaboration and implementation of the projects. A further factor is the diversification of livelihoods; when livelihoods are diversified the indigenes tend to have alternative income sources and reduced dependence on trees. To most respondents, the main criterion for judging success of a project is that trees grow to harvest age or become fully established.

Keywords Perceptions · Public spaces · Reforestation · Stakeholder participation · Harvest age

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Introduction

Human population growth has been found the principal cause of deforestation globally, and including Cameroon (Vitousek et al. 1997; Zhao et al. 2006; Epule et al. 2011, 2013). Wide scale deforestation has been responsible for food insecurity, water scarcity and increase in atmospheric carbon dioxide in Sub-Saharan Africa (SSA), and Cameroon in particular (Armenteras et al. 2010; Epule et al. 2012). To reverse this situation, many communities, governments, donor organizations and non-governmental organizations (NGOs) in many parts of the world, including in Cameroon, have resorted to regreening or revegetating the landscape through tree planting projects.

Between 2000 and 2010, the net annual loss of forest in Africa stemming from deforestation averaged 3.4 M ha (FAO 2010a, b). This rate is lower than what was experienced in Latin America, which lost 4.0 M ha per year during the same period. However, SSA still lags behind in attempts at reducing vegetation loss when compared to Europe and Asia which between 2000 and 2010 had net regreening gains of 0.7 and 2.2 M ha per year, respectively (FAO 2010a, b). Most academic studies on reforestation in Africa and Latin America are either simplistic or generalized such that they are speculative and fail to examine the particular causes of the problem (Agarwal et al. 2005). The study of reforestation is made even more complicated in that appropriate solutions vary between regions due to intricate environmental, cultural, political, economic and socio-cultural differences.

Little evaluation of the success of tree planting projects in public spaces has been undertaken in Cameroon. *Public spaces* are viewed here as areas within the community used by the indigenes on a daily basis and exclude all land that is managed for timber production. These include the *market square* and the *outdoor mosque*. This paper is the first that attempts to study people's perceptions of the causes of success and failure of tree planting projects in public spaces in Touroua, Cameroon. The study was conducted because: (1) Cameroon experiences a net loss of about 220,000 ha of forests annually (about 1 % of its remaining 28 M ha of forests) (FAO 2010a, b), (2) the study area is in the drier and fragile ante-room (core) of desertification and climate change in Cameroon; and, (3) several studies have evaluated issues relating to tree planting in the south of the country or other parts of the tropics where there is a humid tropical forest, but none has dwelled on the issue of success factors in any reforestation projects in Cameroon.

With respect to related studies, Duguma and Tonye (1994) analyzed multipurpose tree and shrub species for agroforestry in the south of Cameroon, and Duguma et al. (1994) examined the growth of multipurpose trees on acid soils. Schreckenberg et al. (2002) analyzed the importance of *Dacryodes edulis* in southern Cameroon, Simmons et al. (2002) compared Panama and Brazil with respect to tree planting by small producers, Degrande et al. (2006) examined fruit trees growing strategies, and Harrison et al. (2008) examined the production of forestry seedlings in Asia. The work of Le et al. (2012) probably comes closest to the objective of this current study in that it assesses the causes of reforestation success in tropical developing countries in terms of technical/biophysical, socio-economic, institutional, policy and management drivers of reforestation outcomes. However, there is

still a great need for studies to evaluate past and continuing reforestation projects in both the drier-fragile north and humid tropics, including the south of Cameroon, most existing studies having a focus on Asia and Latin America.

A study on forest management in Nepal has illustrated the usefulness of population perception studies in resource management. It has been argued that the mechanisms for community based forest management need to be based on the *real-life* experiences of those living close to the forests and not on top-down decision-making (Bartlett and Malla 1992; Pokharel et al. 2007). In this context, it has been concluded that community forest groups are viable structures for sustaining forests in Nepal (Pokharel et al. 2007). In general, people's perceptions are increasingly being considered in forest management. There are examples of such evaluations in Africa south of the Sahara, New England, Tasmania, Ethiopia and Nepal (Mackay 1978; Napier and Napier 1991; Hartup 1994; Colchester 1996; Sall 1996; Hill 1999; Close and Davidson 2002; Smith 2003; Urgessa 2003; Pokharel et al. 2007; Sendzimir et al. 2011; Degrande et al. 2012). In Ethiopia a survey of farmers revealed that a high proportion acknowledged that their forest cover was declining and they would be interested in tree planting if private ownership of trees and forests could be authorized (Urgessa 2003; Bogale and Urgessa 2012). In general, people's perceptions are increasingly being considered in forest management, the approach adopted here. The entire approach of considering the opinions of the 'grassroots' in decision-making is gaining ground.

In this study, the word *maturity* is used to denote trees that have attained harvest or production age for fuel wood, fruits or other products. Neem trees produce fruits 2–3 years after planting, although they take about 10 years to reach full production. Food yields are used to denote the effects of the trees on farm outputs. The *diversification* of livelihood activities in this study means involving the people in other livelihood activities such as raising livestock in ranches, 'petit businesses' or trade, thus reducing their dependence on the trees for either fuel or income. *Personalization* of task involves assigning responsibility for the care and survival of a specific number of trees (for example watering, removing weeds and protecting trees from being eaten by animals) to specific individuals to enhance care and survival. This is what Taylor (1993) described as, 'where local people are genuinely in control of management of forest resources.'

This evaluation is motivated by the fact that perceptions are an important component of environmental impact assessment and understanding the perceptions of the people provides a framework for better results (e.g. Dolisca et al. 2007).This study examines one successful tree planting project and one failed project in Touroua, North Region of Cameroon. People's perceptions are analyzed to verify their understanding of what success and failure in tree planting is are about, their judgment of whether the projects were successful and the reasons for these judgments. This evaluation is important because if the causes of success in tree planting in public spaces are understood, it is easier to design other projects along the same line while taking into consideration the environmental, socio-cultural, economic and political circumstances of the people involved. The key questions this study addresses are: (1) was reforestation a success or failure in the study area? (2) how would a successful or failed reforestation project be judged? (3) what are the

opinions of the population concerning the causes of success or failure of the reforestation projects?

The Study Area

Touroua is in the south west of the north region of Cameroon, 52.4 km from Garoua, the Capital of the North Region of Cameroon. It is situated at latitude 9.0833°N and longitude 12.9667°E (Fig. 1). It has a Sudano-Sahelian climate in which annual rainfall is about 900 mm and average annual temperature ranges of 25 °C with seasonal peaks of about 39 °C during the dry season. It has Guinea Savanna vegetation mixed with trees of various species among which is the Neem tree (*Azadirachta india)*. The main soil types in this region are chromic vertisols, vertisols, planosols, and the Albic and Stagnic Luvisols (Dounias et al. 2002; Sevink et al. 2004). Generally, these soils are thin and very dry and are often mostly suitable for the cultivation of grains and are able to sustain trees if they are planted at the right time of the year, if the trees are drought resistant as is the Neem tree and if the trees are managed carefully (Sevink et al. 2004).

Since both projects were carried out in the same community, this study assumes uniform average annual rainfall, average annual temperatures and similar soils for both areas. Although the trees for both projects were planted at different times of the year, water supply was equally variable and remained a crucial variable in tree

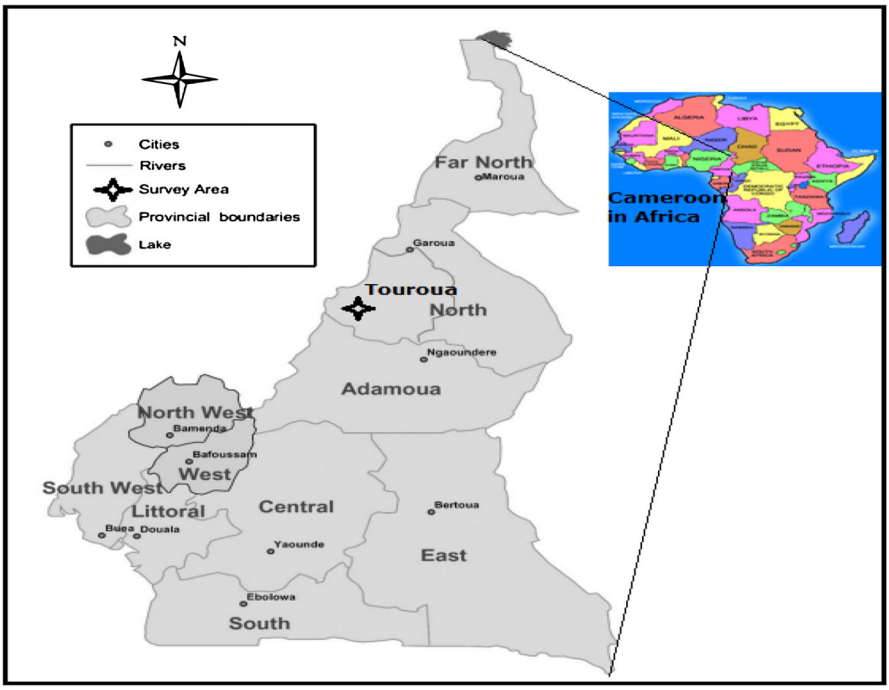

Fig. 1 Location of study area in Africa and Cameroon. *Source* modified from Fontem et al. (2005)

survival. Also, the high rates of deforestation in the North region of Cameroon are essentially due to the high rates of immigration from the far north. The North region has a rate of immigration of 5.1 %, much higher than the national level of 3.2 %; this further demonstrates the role of population changes in explaining tree loss in Cameroon. Njiti and Sharpe (1994) and Epule et al. (2011) evaluated the drivers of forest loss in Cameroon and found population growth as a dominant factor.

The *outdoor mosque* is a religious site used for Friday prayers while the *market square* is a commercial site where the daily trade market takes place. Trees are of great value in these areas because they serve as shade to the users and have ecological benefits such regulating the hydro-carbon cycles, providing environmental aesthetics and sustaining food supply. Evaluating the reasons why the trees in the two projects succeeded or failed serves as a blueprint for the evaluation of other small-scale tree planting projects in Cameroon.

Inception and Maintenance of Projects

The first of the projects examined (*market square* tree planting project) took place in 2000 and by the end of 2002 the trees were well established and in production. Of the 533 Neem trees that were planted in 2000, 460 were still alive in 2002. When the study was conducted in 2011, all these trees were still alive (86.30 % success rate). The total size of the planted area was 1 ha. Planting under the second project (the *outdoor mosque* tree planting) took place in 2001. A total of 533 Neem trees were planted in an area of 1 ha. By the end of 2002, only 221 trees had survived and at the time of data collection in 2011 only 68 of these trees had survived (12.75 % success rate).

These two projects were initiated by a Peace Corp Volunteer. Once the projects were approved and the sites for the planting allocated, the Lamido or traditional ruler, the Divisional Officer, the Mayor, the peace Corp Volunteer and the indigenes proceeded to create a nursery for the production of seedlings. The seeds for the *market square* and *outdoor mosque* projects were planted in 1999 and grown in a single nursery in polybags filled with compost, soil and sand.

The maintenance of the nursery involved watering, removal of invasive weeds and protection (from animals, pests and the sun). After 2–3 months, the seedlings were ready for outplanting. In the case of the *market square* project, the indigenes planted the seedlings with a mixture of cow dung and compost. Treeguards were used to protect the trees from invaders such as sheep and cattle. The protections were usually made of thorny branches which were repellant to invaders. Groups of indigenes were assigned the responsibility of watering the trees and removing weeds. In the case of the *outdoor mosque*, there was little training of the planters and the seedlings were outplanted without compost, treeguards or adequate watering.

Research Method

One focus group discussion (FGD) was held with tree growers, cattle herders, farmers, traders and teachers of the local primary school. The FGD was conducted

by the researchers and three research assistants. All the research questions were read out and explained to the participants. In cases where the participants did not understand because of language barriers, a research assistant that spoke Fulfulde provided the explanation. The participants were also asked to give reasons for their opinions on their choices of responses during the FGD. One key informant was also interviewed to provide an overview of the projects; a field assessment and desk studies were also conducted.

After the FGD, a survey of tree growers, farmers, cattle herders, traders and teachers was conducted, in which a simple random sample of 200 respondents was taken from a total population of nearly 900 people. Equal sub-sample sizes (100) were taken for the *market square* and *outdoor mosque* sites. The survey was designed to obtain the perceptions of the people about the level of success of the projects from segments of the population that are representative of the entire population. The respondents were male and female household heads. The data were prepared for analyses on two Excel spreadsheets representing the two projects, then uploaded into SPSS version 19 for the calculation of descriptive statistics.

The reliability of the results on the *market square* project for reasons for success and on the *outdoor mosque* project for reasons for failure were tested with the use of the Chi squared (χ^2) statistical test of goodness of fit of the sample data to a uniform population distribution of reasons for success or failure. A 5 % significance level was adopted. The hypotheses used are as follows: null hypothesis (H_0) is that the population proportion is equal for each reason for success or failure. The alternate hypothesis (H_1) is that there is some difference between population proportions between reasons for success and failure, i.e. some reasons for success or failure are more important than others. As a rule, if the calculated χ^2 statistic is higher than the critical table value, the H_o is rejected in favour of H_1. Note that the order of importance of the reasons for success or failure is descriptively judged by the ranking of frequencies with no statistical basis for ranking.

Results

The majority of respondents can be described as low income respondents (see Table 1). This is linked to the fact that the average annual income in Cameroon is 619, 618 fcfa (1200 USD)[1] (United Nations (UN) 2012). Most respondents had monthly incomes below the national monthly average (as reported by Epule et al. 2012).

According to a key informant, the exotic Neem[2] trees were selected for these projects because: they are highly attractive; they have rapid growth and commence production after 2 years; they reach a height of about 15–20 m at the age of 10 years; they are evergreen which makes them suitable for soil protection all year round; they have spreading branches that protect the soil from the rays of the sun;

[1] 1 USD was equivalent to 510.098 fcfa in July 2011.

[2] Other tree types common in this community but not used in these projects are, Baobab (*Adansonia digitata*), Yellow Cassia (*Cassia siamea*), Eucalyptus (*Eucalyptus camaldulensis*) and Red Mahogany (*Khaya senegalensis*).

Table 1 Total annual household income levels for both projects

Income groups (1,000 cfaf)	Total males and females	Males	Females
<20,000	48 (24 %)	25	23
20,000–40,000	39 (19.5 %)	22	17
41,000–60,000	33 (16.5 %)	15	18
61,000–80,000	38 (19 %)	18	20
81,000–100,000	28 (14 %)	17	11
>100,000	14 (7 %)	08	06
Total	200 (100 %)	105	95

Source Adapted with permission from Epule et al. (2012)

Table 2 Assessment of respondents' perceptions of reasons of success of tree planting in the *market square*

Reason for success	Males	Rank	Females	Rank	Males and females	Rank
Population participation	7	2	12	1	19	1
Use of fertilizers (cow dung)	2	6	0	9.5	2	7.5
Training of planters	5	3.5	5	4	10	4
Personalization of task	5	3.5	7	3	12	3
Existing policy framework	0	7.5	0	9.5	0	10.5
Diversification of livelihood	8	1	8	2	16	2
Declining food yields	0	7.5	2	7.5	2	7.5
No-cultural ties to some species of trees	0	7.5	0	9.5	0	10.5
No water scarcity	3	5	4	5	7	5
No religious ties to land used for planting	0	7.5	2	7.5	2	7.5
No leadership problems	0	7.5	3	6	3	6
Total success cases	30		43		73	
Total respondents	44		56		100	

they protect the soil from erosion and restore the land phase of the hydrological cycle; they have hard bark that reduces the risk of damage from herbivores, the sun and the wind; they are drought resistant and well suited for dry environments; they form a dense round canopy making them good as shade trees; they have fruits which can also be used for food, to produce oil and soap, and other purposes.

In the *market square* tree planting project there were 44 male respondents. Eleven (25 %) had the perception that the number of trees that grew to harvest age or maturity was the most important description used to judge the meaning of success in tree planting (Table 2). The three other factors in order of importance were trees being able to provide shade 9 (20 %), increased food yields 9 (20 %) and more carbon sequestration 8 (18 %) (Fig. 2a). Out of the 56 female respondents in the *market square* tree planting project, 17 (30 %) had the perception that the number of trees that attained harvest age or grew to maturity was the most important indicator of success in tree planting. The three other factors in order of importance were improved food yields 12 (21 %), trees being able to provide shade 11 (19 %) and

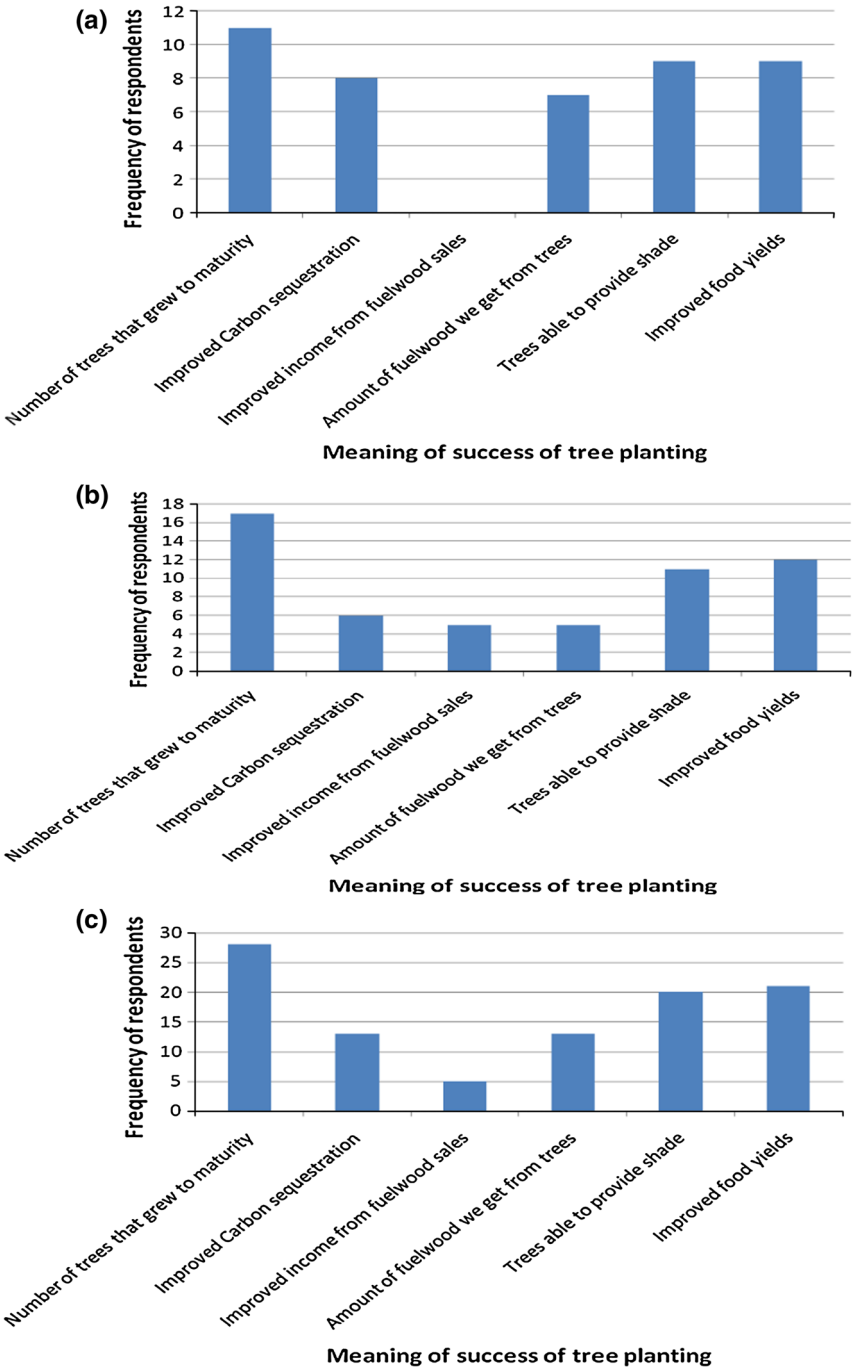

Fig. 2 Perceptions of **a** male, **b** female, and **c** male and female respondents on the judgment of the meaning of success in tree planting in the *market square* tree planting project

increased carbon sequestration 6 (10 %) (Fig. 2b). In terms of both male and female respondents in the *market square* tree planting project, 28 (28 %) had the perception that the number of trees that attained harvest age or grew to maturity was the most important indicator used to judge the meaning of success in tree planting. The three other factors in order of importance were increased food yields 21 (21 %), trees being able to provide shade 20 (20 %), improved carbon sequestration 13 (13 %), and the amount of fuel wood obtained from trees 13 (13 %) (Fig. 2c).

Of the 44 male respondents in the *market square* project, 30 (68 %) said that the project was a success. Out of the 56 female respondents in the project, 43 (76 %) said the project was a success. Of all the 100 respondents in the *market square* tree planting project 73 (73 %) considered the project to be a success. From these results, it can be said that the *market square* tree planting project was a success. The most important reasons or causes of success to male respondents in order of importance were diversification of livelihood activities, training of planters and personalization of task (cumulatively third) (Fig. 3a, Table 2). To the female respondents, the four most important causes of success in tree planting in order of importance were population or stakeholder participation, diversification of livelihood activities, personalization of task and training of planters (Fig. 3b, Table 2). When all these responses are added up, it is observed that for both male and female respondents, the four most important causes of success in order of importance were population or stakeholder participation, diversification of livelihood activities, personalization of task and training of planters (Fig. 3c, Table 2).

In the *outdoor mosque* project, the respondents' perceptions used to judge the meaning of tree planting failure were as follows: Out of the 61 male respondents, 24 (39 %) had the perception that a small number of trees growing to harvest age or maturity was the most important indicator of failure in tree planting. The three other factors in order of importance were trees not being able to provide shade 18 (29 %), reduced carbon sequestration 10 (16 %) and low food yields 9 (14 %) (Fig. 4a). Out of the 39 female respondents, 15 (38 %) had the perception that trees not being able to provide shade was the most important indicator used to judge failure in tree planting (Fig. 4b). The three other factors in order of importance were few trees growing to harvest age or maturity 10 (26 %), low food yields 6 (15 %) and reduced carbon sequestration 4 (10 %). Out of the 100 male and female respondents in this project, 34 (32 %) had the perception that a relatively small number of trees growing to harvest age or maturity was the most important indicator of failure in tree planting. The three other factors in order of importance were trees not being able to provide shade 33 (33 %), low food yields 15 (15 %) and reduced carbon sequestration 14 (14 %) (Fig. 4c).

Concerning whether the *outdoor mosque* project was a success, of the 61 male respondents in this project, 46 (75 %) said that it was a failure. Out of the 39 female respondents, 25 (64 %) said it was a failure. In total, 71 % of respondents thought the project was a failure. From these results, it can be said that the *outdoor mosque* tree planting project was considered a failure.

The most important reasons that were responsible for failure in tree planting in the *outdoor mosque* according to male respondents were: limited population or stakeholder participation, no diversification of livelihood activities, water scarcity

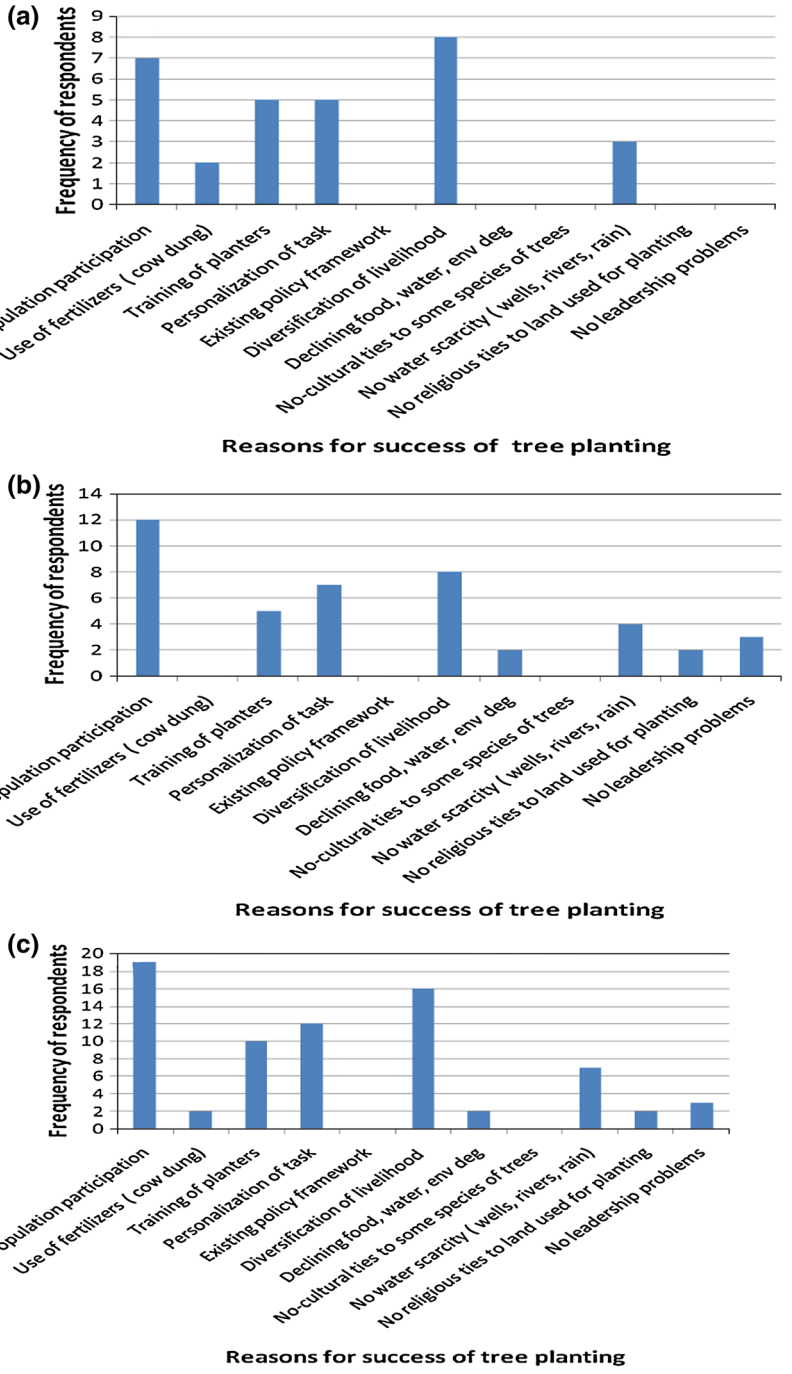

Fig. 3 Perceptions of **a** male, **b** female, and **c** male and female respondents on the causes of success of the *market square* tree planting project

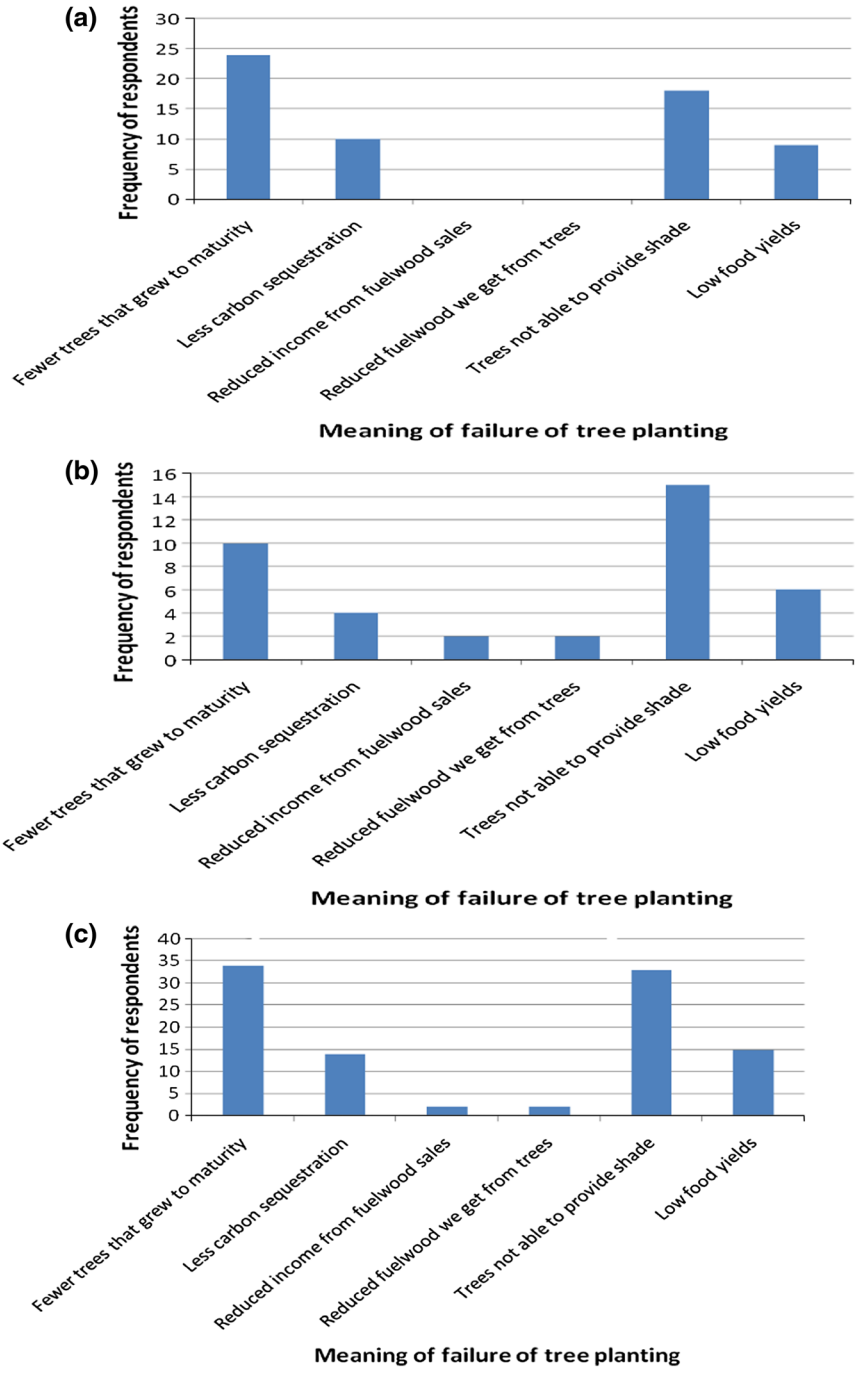

Fig. 4 Perceptions of **a** male, **b** female, and **c** male and female respondents on the judgment of the meaning of failure in tree planting in the *outdoor mosque* tree planting project

and leadership problems (Fig. 5a, Table 3). For the female respondents, the four most important causes of failure in order of importance were limited population or stakeholder participation, leadership problems, no diversification of livelihood activities and lack of training of planters for planting (Fig. 5b, Table 3). When all these responses are added up, it is observed that for both male and female respondents, the four most important causes of failure in order of importance were limited population or stakeholder participation, no diversification of livelihood activities, scarcity of water and leadership problems (Fig. 5c, Table 3).

For the test on the reasons for success in tree planting in the *market square* project, the calculated χ^2 (for 10 *df*) of 52.46 is statistically significant at the 5 % level, hence the null hypothesis is rejected and it is concluded that some of the reasons for success are more important than others. Similarly, for the *outdoor mosque* project and based on the frequencies of all male and female respondents, χ^2 (10 *df*) is 54.97, significant at the 5 % level. Again, the null hypothesis is rejected, and it is concluded that some of the reasons for failure are more important than others. Overall, these results indicate that some of the reasons investigated for project success or failure are more important than others (Table 4).

Discussion

Generally, these results are consistent with several independent studies such as (Mackay 1978; Spears 1983; White 1983; Wylie and Johnston 1984; Close and Davidson 2002). The main reason advanced for the success of the *market square* project was population or stakeholder participation. Tree planting projects are said to be successful when locals are involved and when they know that to achieve success is also to their benefit (Le et al. 2012). Participation includes a strong government commitment to tree planting which also entails the allocation of financial and human resources, a tradition of communal help which involves the indigenes as well as local farmers who plant trees on their own homesteads and the participation of international organizations. Participation is said to be effective when the indigenes are included in the choice of trees to be planted as was the case in Nepal, China, most of Asia and New England (Mackay 1978; Spears 1983; White 1983; Zhang et al. 2002; Moon and Park 2004). According to the FGD and a key informant interview, this project was particularly successful due to the involvement of key stakeholders, including the Mayor, Secretary General, Divisional Officer of Garoua, Peace Corps Volunteer, the Lamido and the inhabitants of Touroua. All facets of the society were considered not just as participants but also in the design, conception and realization of the entire project. This increases the feeling of ownership and brings the project closer to the people.

The diversification of livelihood activities is the second reason advanced for the success of the *market square* project. One way of stopping the indigenes from cutting trees is through the diversification of livelihood activities through the provision of credits, cash or other incentives which can make farmers to take up tree crop planting as a means of subsistence. This is why, they don't have to resort to logging to meet their basic financial or fuel wood needs (Spears 1983; Higgins et al. 1989;

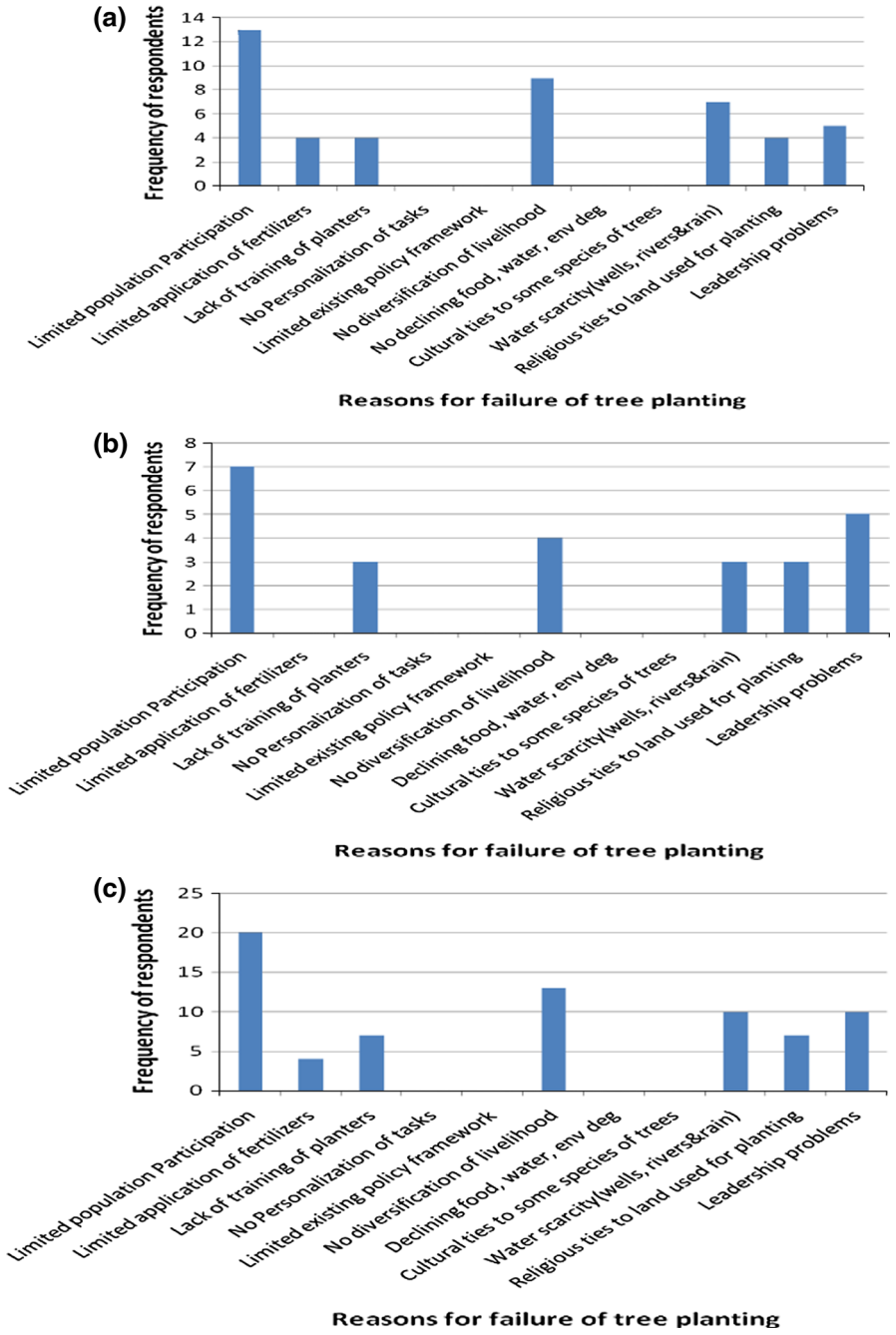

Fig. 5 Perceptions of **a** male, **b** female, and **c** male and female respondents on the causes of failure in tree planting in the *outdoor mosque* tree planting project

Table 3 Assessment of respondents' perceptions of reasons of failure of tree planting in the *outdoor mosque*

Reason for failure	Male	Rank	Female	Rank	Males and females	Rank
Limited population participation	13	1	7	1	20	1
Limited use of fertilizers	4	5.5	0	7.5	4	7
Lack of training of planters	4	5.5	3	4.5	7	5.5
No personalization of task	0	8.5	0	7.5	0	8.5
Limited existing policy framework	0	8.5	0	7.5	0	8.5
No diversification of livelihood	9	2	4	3	13	2
No declining food yields	0	8.5	0	7.5	0	8.5
Cultural ties to some species of trees	0	8.5	0	7.5	0	8.5
Water scarcity	7	3	3	4.5	10	3.5
Religious ties to land used for planting	4	5.5	3	4.5	7	5.5
Leadership problems	5	4	5	2	10	3.5
Total failure cases	46		25		71	
Total respondents	61		39		100	

Table 4 Results of the Chi squared test of goodness of fit between the observed and expected reasons for success and failure in tree planting

Observations	Market square	Outdoor mosque
Calculated χ^2	52.46	54.97
Table value	3.94	3.94

Chokkalingam et al. 2006; de Jong et al. 2006). In the case of the *market square* tree planting project, the people of the area where taken off tree cutting for livelihood survival through the introduction of other activities that substituted the income lost from fuel wood fetching and the loss of food for their cattle. Some of these aspects of diversification included the introduction of domestic animals such as rabbits, cane cutters and the encouragement of rearing of cattle and sheep in ranches. Diversification of livelihoods also called livelihood planning has been described as one of the most important socio-economic drivers for reforestation success by Le et al. (2012). This strategy reduces the degree of dependence on traditional forest products by providing alternatives for the locals.

A third factor that was responsible for the success of the *market square* tree planting project was the personalization of task. In the *market square* tree planting project, personalization of task involved assigning different planters the tasks of watering, removal of weeds and the general survival of the trees. This increased the survival rate of the trees. It has also been argued that adequate determination of the roles of the different stakeholders from the onset of the tree planting project is a fundamental key to success (Wylie and Johnston 1984; Close and Davidson 2002; Dudley et al. 2005). This places stakeholders in a better position of knowing exactly what they are expected to do. In fact, the results of a survey carried out in Ethiopia

on tree planting showed that 93.1 % of the respondents favored private ownership of trees and forests in the midst of wide deforestation. The argument of course here is that with such ownership it is easier to be accountable and to take care of the trees (Urgessa 2003). However, Harrison et al. (2008) observed that a synergy between public and private stakeholders is often very important especially when it comes to seedlings production.

Another success factor is adequate training of planters. Training may include the development of the skills of the planters such as associating planting with adequate watering, post-planting removal of weeds, use of treeguards and the methods of planting such as making sure the seedlings are planted without exposure of their root balls to avoid desiccation. Most tree planting success stories in Tasmanian, China, New England, SSA and most of Asia are linked to such best practices (Mackay 1978; Wylie and Johnston 1984; Potter 1988; Higgins et al. 1989; Kirkpatrick et al. 2000; Zhang et al. 2002). In the case of the *market square* tree planting project, the planters were properly skilled and this was seen as they were involved in good practices such as the use of treeguards for young trees and thereby protecting them from being eaten by cattle, removal of weeds to avoid competition for nutrients and timely planting of the trees just before periods of heavy rainfall (April) which reduced the issue of water logging and scarcity. In general, the technical capabilities that could be acquired through training of the stakeholders affect the sustainability of the project in both the short and long term. In the Philippines, it was found that NGOs needed more technical training to effectively manage reforestation projects (Chokkalingam et al. 2006).

The results of the *outdoor mosque* tree planting project are also consistent with several other published results (Mackay 1978; Spears 1983; Moon and Park 2004). Limited stakeholder participation was the main reason why the project failed. The main stakeholders that were implicated in this project were the Secretary General, the Divisional Officer of Garoua, the Mayor, the Divisional Delegate for Environment and Forests, the Lamido, the indigenes, local nursery man and the Peace Corps Volunteer. According to FGD and interviews with key informants, the main participation loop was seen as the Lamido failed to ask his people to weed the area in time and to help in properly protecting the planted trees. The indigenes did not take the project seriously because they were seriously involved in planting crops on their own farms. By the time the trees were planted the rains were almost running out. This eventually led to the planting taking place when the rains were running out and exposed the trees to the sun and cattle. The authors of these studies (e.g. Mackay 1978; Spears 1983; Moon and Park 2004; Dudley et al. 2005) concluded that limited participation of some facets of the population is likely to create major problems in any tree planting project, because those who do not participate may not be able to appreciate the efforts and value of what has been done and may be poorly informed and incapable of protecting such reforested areas. Several restoration programs have failed because the locals have not been asked what they really want (Dudley et al. 2005).

Another reason for the failure of the *outdoor mosque* project was the lack of diversification of livelihood activities. This is because the project lacked any mechanisms put in place to stop the people from cutting trees for fuel wood and rearing their animals on the trees. No matter how the project is structured, if the

population depends on the forest for subsistence and the stakeholders of the project do not judge how the population can be provided other options of subsistence; the project is likely to fail. This has been very noticeable in the Philippines, China, Malawi, India and West Bengal where the differences in tree planting project survival have been varied for the same reasons (Spears 1983; Lamb and Gilmour 2003).

The *outdoor mosque* project also failed due to water scarcity issues. Just as water is of great importance to humans, it is also very vital to plants. It has been confirmed that watering of plants after planting is a vital practice for their survival. In the same way, scarcity of water may cause the plants to end up being desiccated as has been the case in many parts of Tasmania (Mackay 1978; Mackay et al. 1984; Kirkpatrick et al. 2000). Elster (2000) also argue that tree planting failures in Colombia have been associated to water shortages.

Leadership problems were also responsible for the failure of the *outdoor mosque* project. Spears (1983) and Le et al. (2012) argue that this is a major source of failure in most tree planting projects as some stakeholders are either in conflict with one another or do not seem to agree on the way forward. In the case of the *outdoor mosque* project, there was a leadership problem as the Lamido was unable to order his subjects to protect the trees, remove the weeds on time to prepare the landscape for planting and the planting was done towards the end of the rainy season. Conflict of interest between the Mayor and the delegate for environment and forests on the source of finances to set up the nursery was also a concern.

As concerns the judgment of the meaning of success and failure, this study holds that the number of trees that grew to maturity or attained harvest age is the main issue of concern. Spears (1983) notes that a major way of telling if a tree planting project is successful is by knowing if the trees planted grew to maturity, and all other indicators are within this. This view has also been supported by Gunter et al. (2009) as they argue that in the Andes early height development of native species is an indicator of successful plant growth. Other studies that argue that success in tree planting can be judged from whether the trees have grown to maturity or attained harvest age are (Lamb and Gilmour 2003; Chokkalingam et al. 2006; Nawir et al. 2007; Kanowski et al. 2008).

Conclusion

It has been demonstrated that some management practices result in more successful tree planting projects than others. The overriding conclusion that can be drawn from the success story presented in this study is that where there is a strong tradition of community oriented participation that brings all stakeholders together, success is likely to come by. Also, the diversification of livelihoods and training of planters support project success. To most respondents, success can be judged when trees reach their production stage or attain harvest age. The focus on the socio-economic variables that determine success is guided by the fact that they are considered more important than the biophysical drivers (Walters 1997). The logic of this argument is that once the socio-economic factors are well managed, the biophysical or

ecological factors will also be properly sustained as man remains at the center success.

The elements of success in tree planting are inter-connected and a holistic approach that brings all the factors into consideration is suggested. This means that to better understand the problem, it is relevant to look at several variables and analyse the overall picture. The policy implications of this study are that local realities or population perceptions should be taken into consideration when planning and executing reforestation projects while considering the environmental, climatic and socio-cultural realities of the area.

Further research should be conducted by testing these results on larger tree planting projects, studies that assess tree growth parameters such as heights and diameters are encouraged. Also, funding should be made available to explore this rather virgin aspect of African human ecology. More evaluation studies on other reforestation projects in both the arid tropical grasslands and humid rainforest should also be carried out in Cameroon. Also, as Harrison et al. (2008) argue, an evaluation of the seedling production process should also be carried out and a major shift from the government focused strategy of producing large quantities of seedlings at the expense of quality should be further verified.

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